ADD-ON CERTIFICATE IN GLOBAL COMPETENCE: A PRAGMATIC ANSWER TO A CHALLENGING QUESTION

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ABSTRACT

This paper describes and evaluates a university-wide extracurricular 'Certificate of Global Competence' introduced at KTH Royal Institute of Technology in 2016 as a means to strengthen engineering education with content seen as both very important and hard to fit into existing programmes. Engineering graduates are expected to have the necessary knowledge, skills and attitudes to work effectively and ethically in environments characterised by cultural and social diversity. Going from these demands to educational programmes that integrate the teaching of global competence in true CDIO fashion has, however, proven to be an overwhelming task for many universities. Consequently, most HE institutions seem satisfied with measuring internationalisation using superficial but easily quantifiable data such as the number of international students or the number of exchange students, and KTH is an example of this trend. Students are encouraged to prepare for a global labour market, but their engineering programmes are highly restrictive and leave little or no room for studies of subjects outside the perceived core competencies of their professions. International students at KTH are similarly forced to cope on their own, usually resulting in having them spend most of their free time with other international students. To address this problem, KTH decided to establish the 'Certificate of Global Competence' comprising two elective courses and one study period abroad. The main idea has been to give students the opportunity to equip themselves with essential knowledge, skills and attitudes to function well in intercultural contexts even though they may not be given enough freedom in their programmes. Acknowledging the increasing importance of global competency, we argue that these skills ought to be more saliently described among the desired attributes of graduating engineers in future versions of the CDIO Syllabus.

KEYWORDS

Internationalisation, Global competence, Communication, CDIO Syllabus sections 2 and 3, CDIO Standards 2, 3, 7, 8.

GLOBAL AND LOCAL CHALLENGES

Globalisation has set a number of challenges and opportunities for higher education. Corporate leaders, as well as society at large, require our graduates to have the necessary knowledge, skills and attitudes to work effectively and ethically in environments characterised by cultural and social diversity (e.g. Downey et al. 2006, Diamond et al. 2011). With the inclusion of global citizenship and global competence in UN's Sustainable Development Goals for Education (UN 2015),[1] these requirements are certainly not limited to engineering education, but should perhaps be seen as extra important given the assurances of engineering to remedy some of the problems of globalisation.

The CDIO Initiative has long recognised the need for graduating engineers to interact in an informed way within an ever-changing and evolving engineering field (Crawley 2001). The present CDIO Syllabus also includes relevant skills in sections 2 (Personal and professional skills and attributes), and 3 (Interpersonal skills: teamwork and communication), even though they are not explicitly connected to cultural diversity. However, it has also been noted by members of the CDIO community, e.g., Carlsson et al. (2010) and Hoffman & Christensen (2011), that the actual integration of engineering skills and cultural aspects of engineering poses a challenge to most programme directors and teachers. The gap between what is asked from graduating engineers and what is actually delivered through their education seems indeed to be a salient example of what the CDIO Initiative considered when stating that 'engineering education and real-world demands on engineers have in recent years drifted apart' (CDIO Vision).

We do not mean to suggest that universities are doing nothing. On the contrary, larger universities have made internationalisation one of their key concerns. There are a number of incitements for this, for example, the drive to attract talents, fee-paying students, and proactively work on indicators of influential ranking lists. Regardless of the motives, there is often a genuine will to improve education by accommodating new demands. It is, however, difficult to move from the requests and strivings to the development of educational programmes that successfully integrate the teaching of global competence in true CDIO fashion,[2] including the development of structures and routines needed for a 'comprehensive internationalisation' (Hudzik & McCarthy 2012). In the end, most HE institutions seem satisfied to measure internationalisation by using superficial but easily quantifiable data such as the number of international students or the number of incoming and outgoing exchange students. For this reason, HEI tend to allocate resources and put energy into activities that boost these numbers, while less easily measurable dimensions of internationalisation are left unattended. Despite evidence to the contrary, the students' acquisition of global competency is often expected to happen spontaneously in a setting with people from many cultures, be it at home or abroad (Spencer-Oatey 2015).

KTH Royal Institute of Technology has followed the above-mentioned measuring approach as well. Swedish students have been officially encouraged to prepare for a global labour market but their restrictive programme syllabi leave little or no room for studies of subjects

[1] Target 4.7 | By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

[2] KTH has had failed projects that worked towards integrated internationalisation. The most noteworthy one was the 'language track' launched by a handful of programmes in the early 2000s and later discontinued.

outside the perceived core competencies of their engineering professions. International students at KTH are similarly left to do as they please, usually resulting in them spending most of their free time with other international students.

To address this problem pragmatically, and thereby implicitly acknowledge the educational programmes' failure to make room for an education towards global competencies, KTH decided to establish a university-wide extracurricular 'Certificate of Global Competence' in 2016. The certificate consists of two elective courses and one study period abroad. The idea is that while students may not be given enough freedom in their programmes, they should still be given the opportunity to equip themselves with the knowledge, skills and attitudes necessary to function well in intercultural contexts, i.e., acquire global competence (Deardorff 2009).[3] At the same time, the certificate is a means to enhance the interpersonal contacts that are commonly referred to as 'internationalisation at home', as well as to encourage studies abroad.

By describing the process of developing and implementing the certificate, and relying on data from the first course offered, this paper proposes to evaluate the initiative with three questions: 1) was it a successful way of introducing educational change; 2) is the model sustainable or prone to failure, and most importantly, especially in the CDIO context, 3) is this type of extracurricular certificate programme effective to deliver the intended outcomes? We also argue, independently from these questions, for a more explicit account of global competencies in future versions of the CDIO framework.

THE CERTIFICATE OF GLOBAL COMPETENCE

Implementing a university-wide initiative to offer students the possibility to acquire global competency has been a noteworthy journey to those involved. Starting as a vague idea in 2013 and an online search for best practices around the globe in 2014, the details of the certificate were developed in 2015 by a small working group from KTH Language and Communication in tandem with a reference group comprising representatives from the university's central management (KTH's Vice Dean of Faculty, the head of the International Relations Office), faculty members, and two representatives from the Student Union.

Since this certificate was an unprecedented model for Swedish universities, the validation process was long and complex. To raise awareness within management and faculty, the idea was pitched in a number of occasions to various committees and networks within the university. The initiative was similarly discussed with colleagues from other universities during a nationwide conference on the development of engineering education (Kjellgren et al. 2015).

KTH's CGC was put forward as an effort to help engineering students attain global skills in a visible, measurable, simple and systematic way. This global competence could be beneficial

[3] An established list of global competencies could not be found on in the literature. Diversity, a buzzword in this context, characterises much of the theory building, together with much overlap and re-invention of the wheel, as pointed out by Spitzberg & Changnon (2009). In their typology of models for intercultural competence, the compositional model with its differentiations of knowledge, skills and attitudes is the one most naturally akin to European university courses and the model that inspired us when developing the certificate. As for the specific content, we acknowledge the limitation inherent to anything supposed to be taught in a university course, and the focus we have chosen is reflected in the intended learning outcomes of the two courses, listed in Tables 1 and 2.

whether the students intend to work in Sweden or abroad, and in a number of areas such as academia, trade and industry, or the public sector. The suggested advantages of promoting systematic work in the area at university level have been as follows.

Benefits for institutions

- attract students to more rewarding foreign studies and increase internationalisation activities;
- increase quality review and quality assurance for studies abroad;
- provide current education programmes with a complete model to be introduced without having to change their educational plans;
- strengthen the university's international profile and broaden recruitment of new groups of students;
- support and encourage successful meetings between domestic and international students.

Benefits for students

- utilise an attractive and flexible model that offers an official certificate;
- facilitate the students' studies of global skills;
- acquire global competence while at university;
- enhancing their employability
- strengthen their further developing of global competence after graduation.

The suggested model was designed to create a broader sense of community across cultures and school boundaries as well as promote better work with diversity and internationalisation. The certificate is undoubtedly in line with the university's vision (2027) that sees 'KTH as a custodian of the role of technology in society who takes responsibility for its impact: creating innovative solutions to global challenges'. The certificate may be achieved within the university's approved elective credits, and it will be issued together with the degree certificate. The CGC should act as evidence that a student is well-prepared for today's global professional life.

The CGC model

The KTH Certificate of Global Competence consists of three compulsory parts. The first one focuses on theory and knowledge. The second one is where theoretical knowledge is put to the test in 'field practice', and a third component concentrates on documentation and reflection.

The three consecutive parts of the CGC are:

- Intercultural Competence, 4.5 credits
- Exchange studies or equivalent
- Global Competence, 3 credits

The two courses are offered both in the autumn and spring semesters. Details of each course's content and intended learning outcomes are shown in the following Tables 1 and 2. Subsequently, Figures 1, 2, 3 display the CGC model as additions to programmes at KTH of different length.

Programme students can apply for CGC courses when selecting regular courses. Students may apply for exchange studies at the end of the autumn semester for the upcoming academic year. In order to be eligible for the Global Competence course, the first course and subsequent exchange studies must be completed. The certificate is then issued together with the degree certificate.

Global competence should be built with a long-term perspective and is best cultivated through a combination of theory and practice. In order to put the theory from the first course into practice, the study period abroad is an integral part of the certificate. A study period abroad is an opportunity to explore and create understanding under safe circumstances while forming skills that should be further developed through lifelong learning.

The certificate does not feature mandatory language training, but the importance of language skills is highlighted in the first course, and language studies are encouraged. For a rewarding exchange, students should possess language skills of at least a B level according to the Common European Reference Framework for Languages (CEFR).

In order to count towards the certificate, the exchange study period should be of 12 weeks or longer, Minor Field Studies (MFS), degree project or internship abroad should be of 8 weeks or longer. For international students at KTH, the time in Sweden is taken into account. For KTH students who are not planning to study abroad, or have already studied abroad but still want to improve their global competence, it is possible to only take the first course – Intercultural Competence. International exchange students are also welcome to take this course.

To evaluate the effect of the first course related to the quality of the study abroad period and the students' ability to gain global competence, we plan to use questionnaires both before and after student exchanges, comparing certificate students to non-certificate students.

Table 1. Description of the course LS1600 Intercultural competence

Intended Learning Outcomes	Course content
• Show an understanding, grounded in personal experience, of how personal and cultural variation and diversity influence understanding, emotions, decision-making, communication and teamwork. • Problematize your own and others´ descriptions of culture and identifications based on, for example, gender, nationality, ethnicity, class, age, language and profession. • Give personal examples of knowledge, skills and attitudes that support and develop intercultural competence. • Explain how intercultural competence relates to KTH´s core values, global citizenship, and sustainable development. • Use simple and efficient methods to observe, analyse and work constructively, creatively and ethically with personal and cultural variation. • Reflect on critical intercultural incidents in a constructive and solution-oriented way. • Systematically document, reflect on, and give accounts of intercultural experiences and learning. • Present a personal action plan, grounded in self-awareness, for your continued personal development towards increased intercultural competence.	• With concrete examples and problem-based inductive learning, the course introduces the theoretical models needed for efficient reflection on, and analysis of, intercultural situations, communication and teamwork. • The course provides opportunities to learn and practice, individually and in groups, various practical methods for working constructively, creatively and ethically with personal and cultural variation and diversity, as well as for handling critical intercultural situations. • The course contributes to an increased level of self-awareness and understanding of important issues such as identity, stereotypes, norms and behavioural patterns. • During the course, we will examine roles and expectations, relevant to the student's specific profession, that may exist in different countries, companies and workplaces, and discuss what consequences this may have in, e.g., multi-disciplinary and international projects. • We discuss how intercultural competence relates to KTH's core values, global citizenship, and sustainable development. • The course also covers emotional aspects of international teamwork, living and working abroad as well as returning to your country. • Documentation, reflection and accounting of intercultural experiences and learning are brought up as a step towards personal development and future employability.

Table 2. Description of the course LS2600 Global competence

Intended Learning Outcomes	Course content
• Show an understanding, grounded in theory and personal experience, of how personal and cultural variation and diversity influence understanding, emotions, decision-making, communication and teamwork. • On the basis of relevant theories and personal experience, problematize your own and others' descriptions of culture and identifications based on, for example, gender, nationality, ethnicity, class, age, language and profession. • Work in constructive, creative, ethical, and solution-oriented ways with critical intercultural incidents related to multi-disciplinary and intercultural teamwork and leadership • Critically reflect on how intercultural skills relate to KTH's core values, global citizenship, and sustainable development. • Present systematically documented descriptions of, and self-reflections on, personal intercultural experiences and learning relevant to your future professional life.	• The course builds on LS1600 Intercultural Competence, as well as the students' own experiences from the stay abroad, which together with LS1600 constitutes the entry requirements. • The course gives a deepened, theory- and experience-based understanding of how personal and cultural variation and diversity influence understanding, emotions, decision-making, communication and teamwork. • We explore strategies and methods to enhance intercultural understanding and interaction in order to appreciate and benefit from personal and cultural differences in a constructive, creative and ethical way. • The course puts emphasis on global citizenship, sustainable development, situational leadership in intercultural environments, professional roles and ethics, communicative leadership in intercultural or multidisciplinary teamwork, and employability.

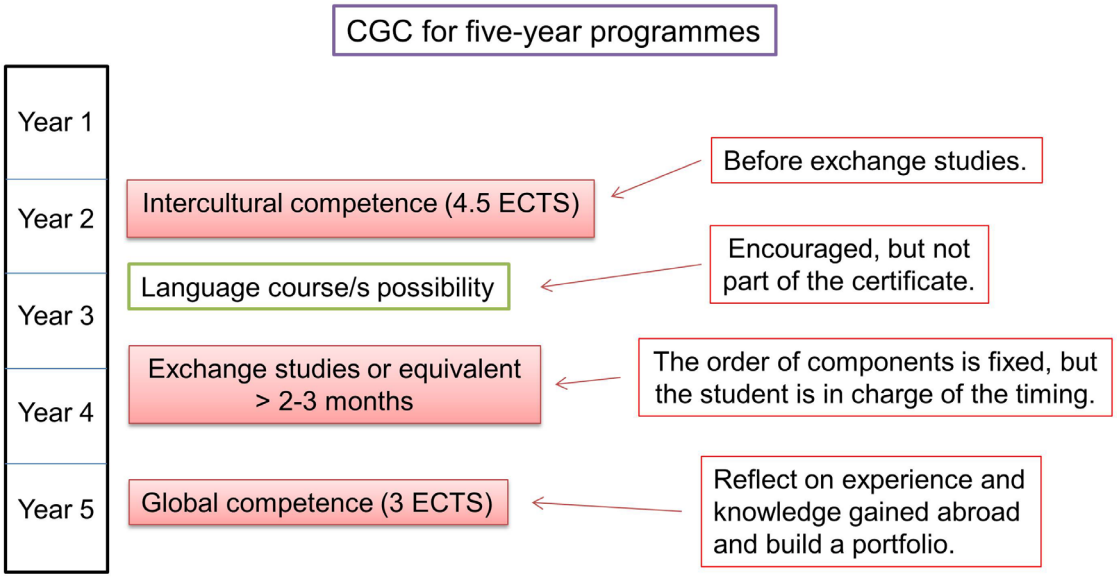

Figure 1. Certificate of Global Competence for a 5-year programme

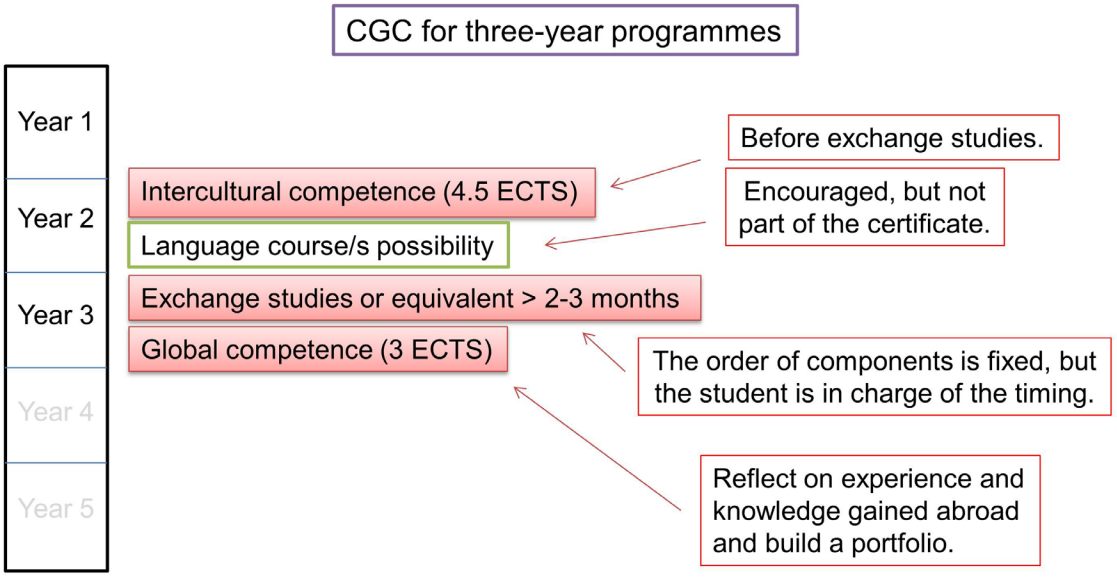

Figure 2. Certificate of Global Competence for a 3-year programme

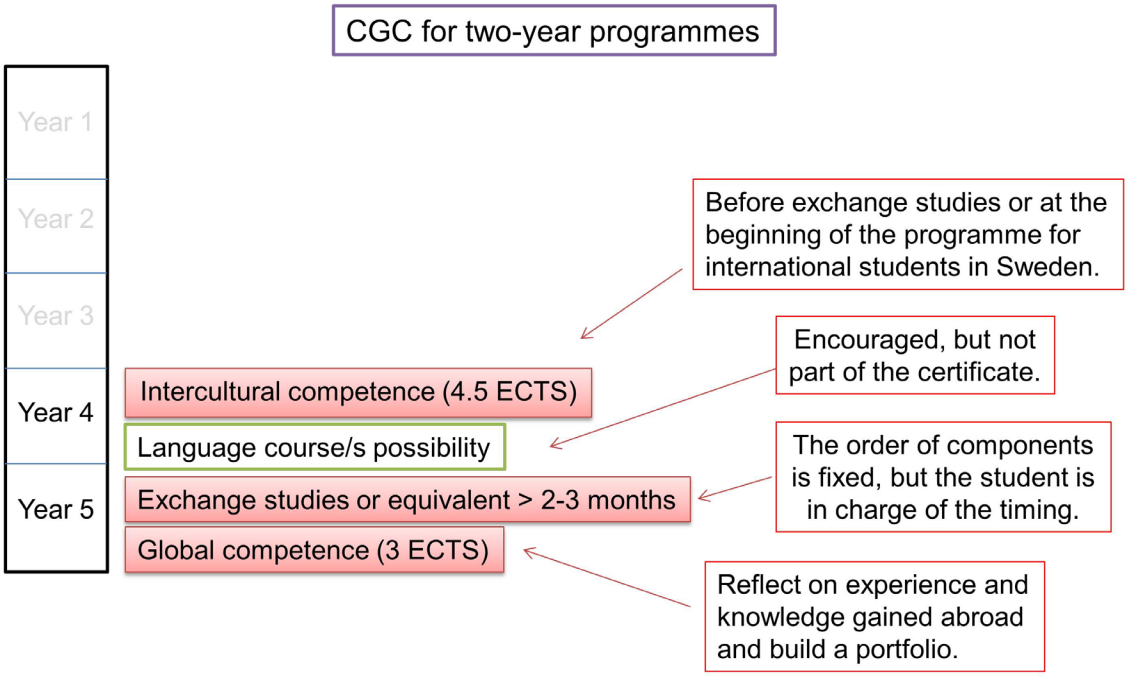

Figure 3. Certificate of Global Competence for a 2-year Master's programme

THE PILOT COURSE

The first course for the certificate, Intercultural Competence, was offered as a pilot in the autumn term 2017 over a period of 10 weeks to a limited number of students (established for 27, 32 admitted and 31 started the course). It was a blended course with a combination of interactive online lectures and workshops in the classroom (on four occasions). Assessments of individual and group assignments were done before, during and after the classroom meetings. Since increased self-awareness and expansion of comfort zones were two main themes, the students also worked continuously on self-reflection journals.[4]

The course offering has been evaluated by looking at three things: completion rate; course activity, and course evaluation. The course was designed to systematically work towards:

- an open and inclusive learning environment;
- coaching as opposed to formal educational tools to encourage student-centred learning and enhance motivation;
- hands-on tasks and learning by doing to allow new knowledge to be tested in real life already from the start;
- flexibility and the inclusion of students as course co-designers based on their continuous evaluation of the course;
- continuous feedback and support, from the teacher as well as from peers in smaller groups formed at the first meeting.

Completion rate of extracurricular courses, e.g. language courses, taken by KTH's programme students may vary. Personal motivation to take such courses often wins over the tendency to drop out of non-compulsory courses. For this course, of the 31 students who started, all but one finished, making for an exceptionally high completion rate of 0.97.

The course used continuous assessment to deliver both formative and summative feedback. It was designed to facilitate an even workload, and avoid end-of-course cramming, which is often seen in traditional courses with a big final examination. The use of a modern LMS facilitated the measuring of students' activity online, and even though the quality of activities cannot be deduced from numbers with precision, Figure 4 shows that activities were evenly distributed (the dip in late October corresponds to the mid-term break and the one in November-December with fewer scheduled online activities).

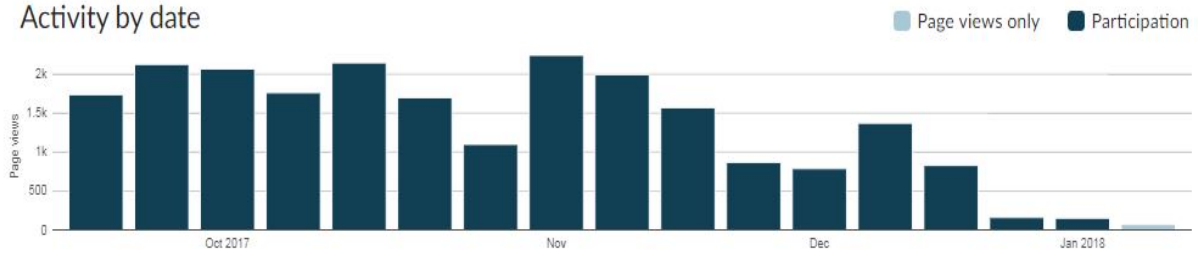

Figure 4. Online activity September 2017 to January 2018

[4] This section of the paper builds on the course analysis made by the course responsible, Björn Kjellgren, and the course teacher, Alena Ipanova.

KTH has used the Learning Experience Questionnaire (LEQ) for a few years as a main tool for course evaluation (see Berglund et al, 2015). The LEQ analyses students' experiences of courses on three levels, each measured with a number of statements for the students to agree or disagree with: the emotional level (meaningfulness, no 1-6), the cognitive level (comprehensibility, no 7-16), and the instrumental level (manageability, no 17-22). While primarily used as a tool for comparing different occurrences of the same course, and then as a means to develop courses, the following polar diagram (Figure 5) displays the picture of a very successful course. Unfortunately, the response rate, slightly less than 30%, makes it impractical to draw broad conclusions solely on the basis of the LEQ. The fact that the students were given ample opportunity to give feedback throughout the course could be a major reason why the response rate to this after-course evaluation was relatively low.

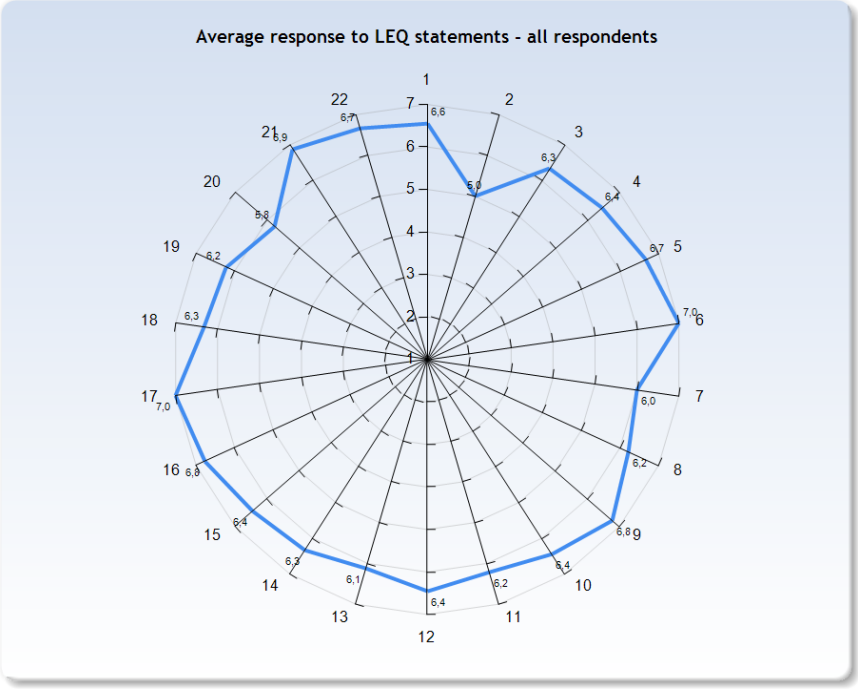

Figure 5. Average response to the 22 LEQ statements after the autumn 2017 course offering

DISCUSSION

We will now turn our attention to the questions posed earlier: has the initiative been a successful way of introducing educational change; is the model sustainable or prone to failure, and, most importantly, especially in the CDIO context, is this sort of extra-curricular certificate programme effective in delivering the intended outcomes?

The certificate was established partly as a response to the difficulty of introducing educational change in already established programmes. Even though the bureaucratic process proved to be a prolonged one, the establishment of the certificate was easier than it would have been if we were to revise 20 or so programmes by adding new courses. In an influential article, Hannan and Freeman (1984) postulated that it would be far easier to overcome the basic structural inertia of an organisational change and avoid failure, if the change did not disrupt what they described as the organisation's core features. Our initiative can be seen as an example of such change, since the university certificate has added

something to the university's educational landscape without challenging the structure, content or mechanisms of the different programmes. The success of the implementation can, nevertheless, also be linked to the fact that we did not work at the organisational borders, but directly with the central management. This means the initiative has in fact not only been a bottom-up one, but also one which has been implemented both from the top (management) and from the side (the extracurricular certificate activities).

With regards to the sustainability of the change introduced, the initiative must be observed over a longer timespan to collect more evidence. It may be argued that this initiative is a vulnerable enterprise, due to the dependence on a limited number of motivated faculty members who have been involved in the process (cf. Edström 2017). This dependency on motivated faculty members in this case relates to the few people involved in the design of the certificate, and to how even fewer were involved in the process of designing the courses. Even so, this is not the whole truth. The certificate would most likely not have been developed if it had not been for KTH's special pedagogical developers' initiative 2014-16 (Berglund et al. 2015, 2016, 2017, Kjellgren et al. 2018). The certificate is, therefore, also a result of the university's dedicated endeavour towards educational development. The long process of obtaining the university management's approval, and the certificate diploma that will be issued to students upon graduation, have given this initiative an official support and institutionalisation rarely granted to similar bottom-up initiatives.

As for the question of whether the introduction of the certificate has started to deliver all the assured benefits, there are no answers at this early stage. However, looking at the benefits for the students, listed above, we have evidence collected from the first course to support the notion that we are moving towards our goals. Concerning the benefits for the university, the effects of an intervention such as this will need even more time. Yet it will likely not be feasible to assess the effect of this certificate programme isolated from other projects. Some of the benefits, for example, those linked to the quality assurance of studies abroad, should be assessed as part of the work with the certificate programme, but the causal relationship to other benefits will be much harder to establish. Given that internationalisation is one of three focus areas for KTH's current president, the measures to support internalisation already in place are likely to be complemented by new ones. In the end, it will be the totality of efforts that will matter, in combination with a host of factors external to the university.

The last question additionally addresses the CDIO context and whether we should be wary of this sort of extracurricular model. Is this not the sort of add-on that we should systematically strive to leave for well-integrated programme syllabi? Our reflection is that perhaps we need not be overly worried. In the course evaluation questionnaire referred to earlier, we asked how the students thought the content of the course could have been integrated or better synchronised with their programme, and received three different answers that we think are valuable starting points for discussions.

The first answer was simply 'make it a mandatory course in the programme syllabus', which could perhaps be taken as an intuitive answer. This was also an opinion we heard from some members of university management when we presented the idea to KTH's Directors of first and second cycle education. Others were, however, quick to point out that most options tend to become less motivating when made mandatory, arguing for the attractiveness of the certificate not being mandatory. Furthermore, as stated earlier, the very difficulty of modifying existing programmes with extra courses was one of the starting points of the whole certificate process.

The second answer we received was ‘It’s already an integrated part of my programme, and in a good way too.’ This was less expected, but of course makes sense from a participating student’s perspective. For a student, the content of the certificate is as real a part of the university education as anything else. The only prerequisite for the existing programmes to allow for this student-design idea would be to allow the students to modify the programme by taking these courses, and adding the study abroad period, which is something that most programmes already do, or are expected to do. Since the certificate does not put any stress or add administrative burdens to the programmes, while still enhancing them with this elective component, it is very appealing.

Having said that, we should not ignore the lack of connection between what the students can learn by working towards the certificate, and the content of other parts of their programmes – the parts that actually make up for the entire programmes in the eyes of the directors, teachers and councils. While waiting for a better integration, the third student answer seems quite reasonable: ‘Make the teachers take the course.’ If we strive towards what Spencer-Oatey (2015) calls the ‘truly internationalised university of the future’, it is not enough to have the involvement of university top management and the students. Comprehensive internationalisation must be a concern for management, administration, researchers, teachers, and students alike. While we presently welcome staff also to the student course (and we will have a few taking the first course this spring), we are looking at ways of strengthening education for global competencies, complementing other activities or opportunities already present, through the development of a new course in teaching and learning in higher education, aiming at teachers and researchers, as well as through workshops for other staff.

CONCLUSIONS AND FUTURE WORK

After running the first course in the three-step completion of KTH’s Certificate of Global Competence, the students’ course evaluations show positive results as described above. In the spirit of Scholarship of teaching and learning, we will continue to document and evaluate the certificate. As noted, the comprehensive integration of the certificate with undergraduate engineering programmes, in line with what the CDIO Initiative advocates, has not been addressed, but circumvented. The certificate has given the students a viable option to develop important competencies, empowered and encouraged them to further hone their skills, but the connections to regular programme activities have been left for them to make on their own. Raised awareness of global competence among the faculty would probably contribute positively to the long-term project of making comprehensive internationalisation a more salient part of the university culture, thereby also helping create a positive feedback loop inspiring even more students to engage with the certificate and with internationalisation.

Global competency plays a central role within the scope of internationalisation of higher education. The importance of globalisation as well as the knowledge, skills and attitudes related to it has been acknowledged in the current edition of the CDIO Syllabus, possibly to some extent in response to earlier appeals for an additional Standard that would explicitly address the dimension of internationalisation and mobility in modern engineering education (Campbell & Becker 2010). We believe this was undoubtedly a step in the right direction, but the attention this area deserves will still be difficult to achieve without something like a specific Standard, an ‘optional Standard’ of the kind proposed by Malmqvist, Edström and Hugo (2017), or internationalisation as a sort of mega-dimension in the CDIO framework.

The present situation, where much of what we call global competence *could* be taught in reference to a long list of different sub-items in the Standards, is in line with the integrated philosophy of the CDIO framework, but few teachers at an average technical university will see them as major intended learning outcomes for their own courses, and they could easily be construed as dispensable parts of an already crammed programme syllabus. Therefore, we regard the KTH solution of establishing an add-on certificate as a promising and relatively easy-to-implement solution in the short run. In the long run, we should strive to make teachers and programme directors keen and able to integrate these skills in true CDIO fashion. For this to happen, the third student suggestion mentioned earlier – to educate the educators and not only the students – would seem to be the most constructive option.

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